A *system* for controlling the key-lock switch

Description

BACKGROUND

[0001] 1. Field of the Invention

[0002] The invention relates to a ***method and system*** for controlling a key-lock switch system. Especially for a system that controls the on/off/switch action of a key-lock device by exchanging the information data to be received and transmitted via spread spectrum digital modulation/demodulation.

[0003] 2. Description of the Prior Art

[0004] For the sake of security, buildings are usually equipped with key-locks in the passage to control the entrance of people with different levels of authority. Among the various methods, the main defects are easy duplication of metal keys for mechanical door key-locks and stripe cards of magnetic key-lock devices; and it is easy to damage the stripe card of a magnetic key-lock device; and the numbers are easily to be read by others when the users is pressing the numbers of the digital key-lock entrance code being easily peeped on the digital key-lock when the user is pressing the numbers.

[0005] Wireless control key-lock systems which use non-touch IC cards to control the key-lock system do exist. Like the key-locks used in the passage of parking lots, it is not easy to duplicate these systems but the available range of the sensors is very limited

[0006] Key-locks for most vehicles use wireless radio frequency signals to transfer signals such as AM (Amplitude Modulation) by amplified size and FM (Frequency Modulation) by frequency speed. Both AM & FM wireless signals need large wave bandwidths that limit the number of changeable codes and the length of signal data. Also there are unsolved defects of noise interference.

[0007] The key-locks use infrared technology with limitations in the directional requirement because the light source and light receptor area must directly face each other to smoothly transfer signals, and the infrared beam is easily stopped by obstacles.

SUMMARY

[0008] The invention relates to a *method and system* for controlling the key-lock switch system by using spread spectrum digital modulation and demodulation technology to handle receiving and transmitting of the data to be exchanged. The technology features high confidentiality and low interference. And the received/transmitted information data confidentiality and privacy is re-enforced through encryption and decryption processes when a further protection of the data is in need.

[0009] To reach the above-mentioned target, the system will include:

at least an electronic key which is operable to transmit information data to control the open, switch or close actions of the corresponding key-lock system which comprises an RF transceiver and an antenna that are located in the transmitting end through which, when operated, the information data of the electronic key is transmitted after being generated by the encryption program and coded by a spread spectrum modulation as a radio frequency signal;

[0010] And at least a key-lock control module comprising an RF transceiver and an antenna that are located in the receiving end through which the radio frequency signals are received, and re-converted into information data by spread spectrum digital demodulation, and the information data is generated by a decryption program as certified data which will be checked and compared one by one by an identifying program with a certified data of the certified table contained in the memory. If it is identified as the same certified data, the key-lock control module will output or cut-off the electronic control signals to switch the key-lock device. And will save the executed control contents and time as recorded data to show the entering, outing, usage situation and etc.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 shows the first example of the invented key-lock switch system.

[0012] FIG. 2 is a combination drawing for the invented electronic key and the key-lock control module.

[0013] FIG. 3 is one of multiple combinations drawing for the invented electronic key and the key-lock control module.

[0014] FIG. 4 shows the second example of the invented key-lock switch system.

[0015] FIG. 5 is the third example for the invention of key-lock switch system and explains how to renew the data content of the operator's table or of the shared data of the electronic key through information data generated from the data which is inputted through the external devices or explains how to transfer the information data.

[0016] FIG. 6 is the forth example of the invention and explains the management and maintenance of the invented key-lock switch system.

[0017] FIG. 7 is an example of how the invention applied in a building

[0018] FIG. 8 is an example of the invention used in motorcycles.

[0019] FIG. 9 is an example of the invention used in a car.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0025]The spread spectrum digital modulation/demodulation mentioned in all paragraphs here means a coding technology which edits the radio frequency signals in digital form which includes quite a lot different methods of which those more typical types are : Direct Sequence Spread Spectrum (DSSS), Chirp Spread Spectrum (CSS), Frequency Hopping Spread Spectrum (FHSS), Time Hopping Spread Spectrum (THSS), Orthogonal Frequency Division Multiplexing (OFDM)and Packet Binary Convolution Coding (PBCC)。

[0026] Regarding the invention of a key-lock switch system, please refer to the FIG. 1 which shows the first example of the invention, which includes at least an electronic key 10 and at least a key-lock control module 30. In the electronic key 10, the power supply 19 provides electric circuits with power needed by all components; the memory 45 stores shared data 23 and the necessary data for the operator's table 22; the operating module 11 is for the operator to transfer control 21 the electronic signal 1 and monitor the operator's action. When the electronic signal 1 is generated, it will start the necessary

transmitting action. First transfer control 21 will read the corresponding operator's data from the operator's table 22 and the shared data 23 to edit the information data 25 through the encryption program 24.. The information data 25 will be converted into radio frequency signals 2 through modulation/demodulation 26 coding technology of spread spectrum digital modulation and DAC/ADC 27 digital to analog conversion technology under the baseband 50. RF transceiver 28 will transmit the coded radio frequency signals into the air via the antenna 29.

[0027] The key-lock control module 30 comprises, the power supply 44 provides electric circuits with the necessary power for all components, RF transceiver 32 and antenna 31 receive the radio frequency signals 2 from the air and convert the frequency signals into information data 35 by the coding process of DAC/ADC 33 analog to digital conversion technology and modulation/demodulation 34 spread spectrum digital demodulation technology under the baseband 50. The memory 45 stores the certified table 39 data to identify and action control, shared data 36 and the control record for recording the time and control action. The decryption program 37 edits the received information data 35 and shared data 36 into certified data 38 for an identification program 40 which identifies the certified data 38 with the data of the certified table 39 one by one. If data is identified as the same, according to the identification result, the on/off/switch action control 41 will output or cutoff the control electronic signal 5 to the key-lock module 30 of the key-lock for on/off action control and save the time and action as a control record 42 for management purposes.

[0028] FIG. 2 shows how the saved certified data of the certified table 39 of the key-lock control module 30 is generated. By an encryption program 24, each saved certified data is edited from the same shared data 23 (not a must, only used when enforcing and increasing the privacy & security of data is in need) and an operator's data of the operator's table 22 of the electronic key 10 which corresponds to the key-lock control module 30. The edited information data 35 and the shared data 36 (not a must, only used when enforcing and increasing the privacy & security of data is in need) of the key-lock control module 30 is re-edited by the decryption program 37. The re-edited data is saved into the certified table 39 for the sake of being identified one by one with the information data 25 of the electronic key 10. Thus, the matching model of the electronic key 10 and the key-lock control module 30 is unique and will not be duplicated.

[0029] FIG. 3 explains the operator's table 22 and the certified table 39 stored in the memory. The operator's table example 22a of an electronic key 10 is stored with a data

category and the operator's data contents. The data category specifies the type of data contents and the data content is used to control the key-lock. The certified table example 39a of the key-lock control module 30 is stored with the control action and certified data contents. Through identifying the certified data content, the on/off switch control 41 will output or cutoff of control electronic signals 5 according to the instruction of the identified certified data content.

[0030] The operator's table 22 of an electronic key is able to be stored with lots of data to correspond with many different key-lock control modules 30. The certified table 39 of the key-lock control module 30 is also able to be stored as many types of certified data by the way explained in FIG. 2 to correspond with the many different electronic keys 10. Thus, the electronic key 10 and the key-lock control module 30 may be a combination of one electronic key 10 controlling multiple key-lock control modules 30 or of one key-lock control module 30 corresponding to multiple electronic keys 10 besides the one by one combination.

[0031] Below FIG. 4, FIG. 5 and FIG. 6 will skip the modulation/demodulation 26/34, information data 25/35 and editing of certified data 38, and identification of certified contents as they are the same as the description in previous paragraph.

[0032] The second example in FIG. 4 shows another type of key-lock switch system. The key-lock control module 30 provides data line 7 to connect with external devices. The external data input system 51 inputs information data 35 through an in-out controlling unit 43 to control the key-lock device which is connected with key-lock control module 30.

[0033] The third example in FIG. 5 is a function of expansion for the first example and explains how to renew the data content of the operator's table 22 or of the shared data 23 in the electronic key 10 by information data 25 generated from the data which is inputted through external devices or explains how to transfer the information data 25. The user renews the data content of the operator's table 22 or of the shared data 23 in the electronic key 10 through the data input system 51 which is an external device and is connected with the electronic key 10 by data line 6. After the data is inputted, the transfer control 21 will determine to transfer the information data 25 generated from the inputted data or with which to renew the content data of operator's data 22 or of the shared data 23. When the operating module 11 is operated, the system will operate with the renewed data.

[0034] The forth example in FIG. 6 adds a function to the first example and explains the management and maintenance of the invented key-lock switch system. The key-lock control module 30 provides a data line 7 to connect external devices. The remote management system 52 may connect with the key-lock control module 30 through the data line 7 or radio frequency signals 2. The remote management system 52 may read, update, edit and delete the content of the shared data 36, control record 42 and of the data of the certified table 39 of the memory 45 in the key-lock control module 30.

[0035] The FIG. 7 shows an example of how the invention is applied in a building and explains, through output or cutoff electronic signals 5 to control the key-lock device, a second security protection method to open the door besides using the metal key. A building 60 is equipped with a key-lock control module 30. A user presses the remote control key of the electronic key 10. Once data content of the operator's table 22 corresponds with the pressed key is transmitted as radio frequency signals 2 which are edited by digital modulation process of the electronic key 10, and the key-lock control module 30 within a valid distance re-edits the information data 35 by digital demodulation, and the identification of identifying programs the data passes mapping and identification, the on/off switch control 41 then outputs an electronic signal 5 of the key-lock device of the passage 61 and opens the door of the passage, same as the metal key does.

[0036] FIG. 8 shows an example used in motorcycles. A motorcycle equipped with a key-lock control module 30 of key-lock device of starting engine 62. The user may turn on/off the power supply of the key-lock device of the starting engine 62 by using the remote control device which an electronic key 10 equipped with and prevents the motorcycle from being stolen.

[0037] FIG. 9 shows an example of the invention of key-lock switch system used in a vehicle. The user operates the remote control device which an electronic key 10 is equipped to open/shut the door of a vehicle 63 and, at the same time, controls the power supply of the key-lock device of a vehicle's starting engine 64 by switching the control of the key-lock control module 30.

[0038] The above examples are for to explain the convenience and the range of rights and privileges claimed by the invention described in the patent claim section and is not limited by the above examples.